

Copper in Drinking Water

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How Copper Gets Into Water

Copper is a mineral and natural component of soils. It is an essential nutrient for humans and plants.

Industrial pollution, domestic wastewater, mining wastewater, and weathering of copper-bearing rocks are major sources of copper in surface and ground waters. Discharges of copper into sewer systems from some residential areas have also been found.

Leading areas of use for copper and its alloys are the plumbing, electrical, and electronic industries. Copper compounds are used as agricultural fungicides, algacides in water reservoirs, in food supplements, and fertilizers.

In Washington, most copper in drinking water comes from corrosion of household plumbing. Public water supplies are required to conduct treatment to reduce corrosion when more than 10 percent of the tap water samples exceed 1.3 parts per million (ppm) of copper.

Copper from plumbing corrosion can accumulate overnight. Flushing the water from the tap for 30 to 45 seconds can reduce the copper that can accumulate when the household plumbing is not in use.

Health Issues

Copper is an essential mineral in the diet. Too much copper, however, can cause health problems. Major food sources of copper are shellfish, nuts, grains, leafy vegetables, and stone fruits. Typical sources of copper from food range from less than 2 milligrams (mg.) to 5 mg. per day.

Health studies have found that copper in drinking water can add 4 to 45 percent more copper to a person's diet than what is in food sources. Absorption studies have indicated that the body excretes about half of ingested copper, which offers some protection against copper poisoning. Copper is widely distributed within the tissues of the body, but accumulates primarily in the liver and kidneys.

The National Academy of Science recommends 2-3 mg of copper in the daily diet. A single dose of 15 mg of copper can cause nausea, vomiting, diarrhea, and intestinal cramps. Severe cases of copper poisoning have led to anemia and to the disruption of liver and kidney functions. Individuals with Wilson's and Menke's diseases (genetic disorders resulting in abnormal copper absorption and metabolism) are at higher risk from copper exposure than the general public, and can have serious health problems.

Detecting Copper in Drinking Water

Blue-green stains on plumbing fixtures are usually an indication of the presence of copper in drinking water. Some factors that affect copper levels in household drinking water are:

- Acidic water (low pH)
- Soft water (low in calcium and magnesium)
- High chlorine residual levels
- Long standing time in pipes
- Elevated water temperature

Backflow Prevention for Carbonated Beverage Dispensers

There is a great risk of copper contamination from carbonated or acidic beverages that have been in contact with copper tubing, fixtures, or containers. The carbon dioxide used in soft drink dispensers is under pressure. Where it is mixed with the incoming water, there is a potential for carbon dioxide to backflow through the incoming water supply. The carbon dioxide then can corrode copper plumbing, which can add copper to soft drinks. The surest way to prevent the carbon dioxide from contacting copper plumbing pipes is to install a reduced pressure backflow prevention assembly (RPBA). This assembly should be installed on the incoming water supply pipe before the carbon dioxide injection point. Copper piping should not be used past the injection point. (Some utilities may allow the substitution of a dual-check valve with an intermediate vent in place of the RPBA).

For More Information

Washington State Department of Health:

Drinking Water Southwest Regional Office:	360-664-0768
Drinking Water Northwest Regional Office:	253-395-6750
Drinking Water Eastern Regional Office:	509-456-3115
General Information:	1-800-521-0323
Office of Drinking Water Web site:	http://www.doh.wa.gov/ehp/dw

